

CLAIMS

What is claimed is:

1. An image forming apparatus, comprising:
 - a plurality of rollers, disposed with generally parallel axes;
 - a retraction plate movable between engaged and retracted positions; and
 - a plurality of rotational couplings moved by said retraction plate, each said rotational coupling operative to transmit a rotary force to one of said rollers when said retraction plate is in said engaged position;whereby said couplings move laterally in an axial direction of said rollers as said retraction plate moves between said engaged and retracted positions.
2. The image forming apparatus of claim 1 wherein said rollers comprise at least one photoconductive member.
3. The image forming apparatus of claim 1 wherein said rollers comprise at least one developer member.
4. The image forming apparatus of claim 1 wherein said rollers comprise at least one removable cartridge including both a developer member and a photoconductive member.
5. The image forming apparatus of claim 1 wherein said rollers comprise at least one pair of removable cartridges, one said cartridge including a developer member and the other said cartridge including a photoconductive member.

6. The image forming apparatus of claim 1 wherein said rotational couplings comprise Oldham couplers.
7. The image forming apparatus of claim 1 wherein said retraction plate moves between said engaged and retracted positions in response to an applied force.
8. The image forming apparatus of claim 7 wherein said applied force is generated by a user opening a portion of said image forming apparatus.
9. The image forming apparatus of claim 1 wherein said retraction plate pivots about a pivoting axis to move between said engaged and retracted positions.
10. The image forming apparatus of claim 9 wherein said pivoting axis is disposed along one edge of said retraction plate.
11. The image forming apparatus of claim 1 wherein said retraction plate moves laterally between said engaged and retracted positions, in the axial direction of said rollers.

12. A pivoting coupling retraction mechanism for an image forming apparatus, comprising:

a pivoting retraction plate having a pivoting axis and movable between engaged and retracted positions by pivoting about said axis; and

a plurality of rotational couplings moved by said retraction plate, operative to couple rotational forces to a corresponding plurality of rollers disposed in said image forming apparatus when said retraction plate is in said engaged position.

13. The mechanism of claim 12 wherein said pivoting retraction plate pivots about said pivoting axis in response to an applied force.

14. The mechanism of claim 13 wherein said applied force is generated by a user opening a portion of said image forming apparatus.

15. The mechanism of claim 12 wherein said rollers comprise at least one developer member and at least one photoconductive member.

16. A translating coupling retraction mechanism for an image forming apparatus, comprising:
 - a retraction plate movable between engaged and retracted positions;
 - a plurality of rotational couplings moved by said retraction plate, operative to couple rotational forces to a corresponding plurality of rollers disposed in said image forming apparatus when said retraction plate is in said engaged position; and
 - an articulating member movable in a first lateral direction along said retraction plate;
 - wherein movement of said articulating member in said first lateral direction is operative to translate said retraction plate in a second lateral direction generally orthogonal to said first lateral direction, thereby moving said plate between said retracted and engaged positions.
17. The mechanism of claim 16 wherein said retraction plate is disposed in a generally vertical orientation.
18. The mechanism of claim 16 wherein said articulating member includes at least one pin.
19. The mechanism of claim 18 further comprising a fixed bracket, and wherein said articulating member is constrained to motion in said first lateral direction by engaging said at least one pin in a slot in said fixed bracket, said slot oriented along said first lateral direction.

20. The mechanism of claim 18 wherein said retraction plate is translated in said second lateral direction by engaging said at least one pin with a cam surface attached to said retraction plate, said cam surface orientated at a non-zero, acute angle with respect to said first lateral direction.
21. The mechanism of claim 20 wherein said cam surface is oriented at a generally less than 45-degree angle with respect to said first lateral direction.
22. The mechanism of claim 21 further comprising a retraction plate bracket affixed to said retraction plate, and wherein said cam surface is an inner surface of a slot formed in said retraction plate bracket.
23. The mechanism of claim 16 wherein said rotational couplings include at least one Oldham coupler.
24. The mechanism of claim 16 wherein said rollers include at least one developer member.
25. The mechanism of claim 16 wherein said rollers include at least one photoconductive member.
26. The mechanism of claim 16 wherein said articulating member moves in said first lateral direction in response to an applied force.
27. The mechanism of claim 26 wherein said applied force is a rotary force.

28. The mechanism of claim 27 wherein said rotary force is converted to a lateral force by a rack and pinion gear system.
29. The mechanism of claim 26 wherein said applied force is generated by a user opening a portion of said image forming apparatus.

30. A method of installing a removable cartridge in an image forming apparatus, said cartridge receiving rotary force from a coupling in said image forming apparatus, comprising:

 moving said coupling to a retracted position by moving a retraction plate to contact and retract said coupling;
 inserting said cartridge in said image forming apparatus in a direction at right angles to the axial direction of said coupling; and
 moving said coupling to an engaged position in which said coupling transfers rotary power to said cartridge, by moving said retraction plate such that said coupling moves in an axial direction towards said cartridge.

31. The method of claim 30 wherein moving said retraction plate to contact and retract said coupling comprises pivoting said retraction plate about a pivot axis spaced apart from said coupling.

32. The method of claim 30 wherein moving said retraction plate to contact and retract said coupling comprises translating said retraction plate in the axial direction of said coupling.

33. The method of claim 30 wherein translating said retraction plate in the axial direction of said coupling comprises translating an articulating member in a direction orthogonal to the axial direction of said coupling, said articulating member engaging said retraction plate at at least one cam surface disposed at a non-zero, acute angle to the direction of said articulating member translation, so as to urge said retraction plate in the axial direction of said coupling.

34. An image forming apparatus, comprising:
 - a housing;
 - four first cartridges removably disposed in said housing, each including a developer member;
 - four second cartridges removably disposed in said housing, each including a photoconductive member;
 - four first couplers disposed in said housing, movable in the axial direction thereof between retracted and engaged positions and operative to supply rotary power to said four first removable cartridges in said engaged position;
 - four second couplers disposed in said housing, movable in the axial direction thereof between retracted and engaged positions and operative to supply rotary power to said four second removable cartridges in said engaged position; and
 - a retraction plate disposed in said housing, operative to simultaneously move said four first couplers and said four second couplers between said retracted and engaged positions;
 - wherein all eight said couplers are substantially parallel.
35. The image forming apparatus of claim 34 wherein said retraction plate is operative to pivot about a pivot axis spaced apart from said first and second couplers, said pivoting operative to move said couplers between said retracted and engaged positions.
36. The image forming apparatus of claim 34 wherein said retraction plate is operative to translate in the axial direction of said couplers, said translation operative to move said couplers between said retracted and engaged positions.

37. The image forming apparatus of claim 36 further comprising:
 - an articulating member movable in a direction orthogonal to the axial direction of said couplers;
 - at least one first pin disposed on said articulating member, said first pin engaging an angled cam surface disposed at a non-zero, acute angle with respect to the axial direction of said couplers, said angled cam surface rigidly affixed to said retraction plate, such that said first pin exerts a force on said angled cam surface in the axial direction of said couplers when said articulating member moves in a direction orthogonal to the axial direction of said couplers.
38. The image forming apparatus of claim 37 wherein said angled cam surface is an interior surface of an angled slot formed in a bracket affixed to said retraction plate.
39. The image forming apparatus of claim 37 further comprising:
 - at least one second pin fixed with respect to said housing, said second pin engaging an axial cam surface disposed in the axial direction of said couplers, said axial cam surface rigidly affixed to said retraction plate, such that said second pin is operative to restrict motion of said retraction plate to the axial direction of said couplers.
40. The image forming apparatus of claim 39 wherein said axial cam surface is an interior surface of an axial slot formed in a bracket affixed to said retraction plate.